

REGULATION BRANCH
Division of Water Resource Management

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____ Approval
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____ Information

GEOHERMAL ACTION PLAN

**Prepared by State and County
Geothermal Task Force**

September 1991

JOHN WAIHEE
Governor

LORRAINE INOUE
Mayor

State - County Geothermal Task Force

	State of Hawaii	County of Hawaii
Task Force	Murray E. Towill, Co-Chairperson William W. Paty John C. Lewin	Barry Mizuno, Co-Chairperson Norman Hayashi Harry Kim
Sub-Committee Members	Takeshi Yoshihara Bruce Anderson Manabu Tagomori Maurice H. Kaya Tom Arizumi Jerry Haruno Gerald Lesperance Dean Nakano Janet Swift Michelle Wong-Wilson Harold Matsuura	Tadato Nagasako Rodney Nakano Bruce Butts

Preface

On June 12 and 13, 1991, a blowout occurred at Puna Geothermal Venture's geothermal well KS-8 near Pahoa in the Puna District. The blowout caused concern for the health and safety of nearby residents. Further activity at the site was temporarily suspended.

The State and County cooperated in the retention of third-party, mainland experts to investigate the drilling equipment and procedures (Element I) and the noise and air quality aspects of the blowout (Element III). An in-house investigation was conducted on the emergency response plan (Element II). These three investigations resulted in written conclusions and recommendations.

The purpose of this Action Plan is to delineate the actions needed to be taken by government to respond to the investigators' recommendations. The plan includes specific tasks, due dates, responsible agencies, resources required and the source of those resources, and comments. Some of the actions must be completed before Puna Geothermal Venture is allowed to proceed with development. Some agencies, particularly State agencies, recommended additional actions which will be undertaken and reported by means other than this Task Force.

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Drilling

Emergency response plan

Air and noise monitoring

Glossary

Objectives

- Element I Determine how drilling Puna Geothermal Venture's wells may proceed safely
- Element II Based on the experience at well KS-8, determine what changes are necessary to improve Puna Geothermal Venture's emergency response plan.
- Element III Based on the experience at KS-8, determine what changes in air quality and noise monitoring programs are necessary to improve the management of Puna Geothermal Venture's permits.

Glossary

ASAB - Air Surveillance and Analysis Branch (Air Lab)
ASTM - American Society for Testing of Materials
BACT - Best Available Control Technology
BOPE - Blowout Prevention Equipment
CAB - Clean Air Branch
CHPD - County of Hawaii Planning Department
DOG - California's Division of Oil and Gas
GAMP - Geysers Air Monitoring Program
GEO-TAC - Geothermal Technical Advisory Committee
HCD - Hawaii County Civil Defense
HFD - Hawaii County Fire Department
HPD - Hawaii County Police Department
PGV - Puna Geothermal Venture
N & R - Noise and Radiation Branch
NGO - National Geothermal Organization (actually National Drilling Organization)
SAIC - Science Applications International Corporation
QA - Quality Assurance

GEOTHERMAL ACTION PLAN

1. Changes in PGV's Drilling Procedures and Supervision (Element 1)

A. Operators Supervisory Personnel

	<u>DUE DATE</u>	<u>AGENCIES:</u> 1. LEAD 2. SUPPORT	<u>1. COST</u> <u>2. SOURCE</u>	<u>COMMENTS / SCHEDULE</u>
1. DLNR require operators to: (pg. 13 & 15)	10/01/91	DLNR	No cost to government	Amend Plan of Operati: 12/31/91 amend Plan o KS-4, 5, 6, 9, 10, 11
a. Have supervisors on rig floor while drilling, especially during crew changes				
b. Enter all blowout prevention drills and BOPE operations in A.I.D.C. tour reports				
c. School all toolpushers, drillers and derrickmen in the use of recommended monitoring equipment				
d. Ensure all drilling personnel understand the implications of changes in subsurface conditions as indicated by the monitoring equipment				
e. Establish criteria for all drilling personnel to communicate significant changes in subsurface conditions to supervisors and regulators				
2. Be conservative and flexible in their approach to casing wells above 2,000 ft. (pg. 13)	10/01/91	DLNR	No cost to government	Amend Plan of Operati: 12/31/91 amend Plan o for KS-4, 5, 6, 9, 10
3. When drilling below 500 feet, without BOPE, to: (pg. 14)	10/01/91	DLNR	No cost to government	"
a. Run maximum bottom hole temperatures at every connection, looking for increase in thermal gradient				
b. Take representative water samples and analyze as soon as possible for salinity and conductivity increases				
c. Catch cutting samples every 10 feet and analyze for hydrothermal minerals				
d. If it appears geothermal zone is to be encountered, with approval of DLNR, operator run casing, cement and rig BOPE				

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for KS-8; by
Operations for

for KS-8; by
Operations
11

GEOTHERMAL ACTION PLAN

1. <u>Changes in PGV's Drilling Procedures and Supervision (Element 1)</u>		<u>DUE DATE</u>	AGENCIES: 1. LEAD 2. SUPPORT	1. COST 2. SOURCE	<u>COMMENTS / SCHEDULE</u>
B. Equipment Modifications					
1.	DLNR require operators to: (pg. 14 & 15)	10/01/91	DLNR	No cost to government	=
	a. Install larger flow relief from BOPE stack				
	b. Install low pressure burst plate in flow line to divert flow				
	c. Include an additional double gate preventer in the BOPE stack				
	d. Install a silencer or muffler in the 13 3/8 inch diverter line				
	e. Equip mud pumps with the maximum sized pump liners				
	f. Provide adequate cool water supply, on site, to kill well				
	g. Provide a larger mud cooler or add a mud cooler				
	h. Install monitor to alert driller to downhole pressures and changes				
	i. Install mud pit alarm system to alert driller				
C. Regulatory Oversight (pg. 15 & 16)					
1.	Prepare MOU between DLNR and DOI assigning oversight and control of both production and injection wells to one agency	10/01/91	DLNR DOI	NC	Draft MOU has been pr
2.	Establish mechanism whereby operator permitted to propose and agency approve on-site modifications to casing program or drilling operations	10/01/91	DLNR	NC	
3.	DLNR review casing program on a well-to-well basis, incorporating accumulated knowledge	10/01/91	DLNR	NC	
4.	Require operators to inform DLNR of changes in the reservoir model	10/01/91	DLNR	NC	Amend Plan of Operati 12/31/91 Amend Plan o KS-4, 5, 6, 9, 10, 11

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ed

for KS-2; by
ersions for

GEOTHERMAL ACTION PLAN

1. Changes in PGV's Drilling Procedures and Supervision (Element 1)

		<u>DUE DATE</u>	AGENCIES: 1. LEAD 2. SUPPORT	1. COST 2. SOURCE	<u>COMMENTS / SCHEDULE</u>
5.	DLNR to update independent reservoir model	12/31/91	DLNR	NC	Use GEO-YAC, Geothermal
6.	Delete specific BOPE and casing requirements in administrative rules	12/31/91	DLNR	NC	Amend Ch. 13-183 Admin
7.	Prepare standard specifications with specific construction details to include BOPE and procedures for the construction of geothermal production and injection wells	12/31/91	DLNR	NC	Use California DGS man
8.	Ask ISO and ASTM to review current procedures and establish standards for geothermal drilling	12/31/91	DLNR	TBD	

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or other consultants

trative Rules

as model

**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

ENERGY DIVISION, 835 MERCHANT ST., 8th FLD, HONOLULU, HAWAII 96813

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DEPUTY DIRECTOR

FACSIMILE TRANSMITTAL

PLEASE DELIVER THE FOLLOWING PAGES TO:

Mr. Tom Arizumi	548-7226	(c/o Air)
Mr. Jerry Haruno	548-1173	
Mr. Harry Kim	935-6460	
Mr. Rodney Nakano	961-9615	
Ms. Janet Swift	548-6052	
Ms. Michelle Wong-Wilson	933-4602	

FROM: Gerald O. Lesperance

SUBJECT: Geothermal Action Plan

MESSAGE: Tom Arizumi - Please pass copies to others at Waterfront PlazaJanet Swift - Same for DLNRRodney Nakano - Same for County BuildingWe will send a list of acronyms and a title page next week.DATE: Sept. 6, 1991TIME: 3:10pTotal number of pages (including Transmittal Page): 10

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DRAFT 8/27/91

GEOHERMAL ACTION PLAN

State - County Geothermal Task Force

GEOTHERMAL ACTION PLAN

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STATE ADMINISTRATION

I. PROGRAM

A. Item

1. Task

DUE DATE

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

I. Asset Fund

A. Provide recommendation to Governor whether and in what form the State should participate. (DBED)

9/13/91

DBED/
DLNR

N/A

County is developing rules under which the fund will be administered.

B. Review with the Mayor the uses of the fund, including the question of relocation. (DBED)

11/1/91

DBED/
DLNR

N/A

Permanent or temporary relocation of residents?

C. Prepare legislation, if desired, authorizing contributions from appropriate source(s). (DBED)

12/31/91

DBED/
DLNR

N/A

Revenue from potential HGP-A steam sales is one possible source.

II. Royalty Waiver

A. Provide recommendation to Governor on request by PGV for waiver of royalty.

9/13/91

DLNR/
DBED

N/A

Land Board can, by law, waive royalty payment for up to 8 years.

III. State Geothermal Plan

A. Prepare a coherent plan including short, intermediate, and long-range goals. Discuss policies and priorities. (DBED)

11/1/91

DBED
DLNR

N/A

Elements (1) commercial development ("go/no go"); (2) resource assessment (SOH, etc.); (3) largescale export project - EIS and Master Plan; formulate plan in the context of energy policy: HEP & IRP.

GEOTHERMAL ACTION PLAN

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STATE ADMINISTRATION

I. PROGRAM

A.	Item		1. LEAD	1. COST	
	1. Task	<u>DUE DATE</u>	<u>2. SUPPORT</u>	<u>2. SOURCE</u>	<u>COMMENTS / SCHEDULE</u>
B.	Present State Geothermal Plan to County (DBED)	12/1/91	DBED DLNR DOH	N/A	
C.	Present State Geothermal Plan to Legislature. (DBED)	1/31/92	DBED DLNR DOH	N/A	

GEOTHERMAL ACTION PLAN

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DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF WATER RESOURCE MANAGEMENT

I. PROGRAM

A. Item

1. Task

DUE DATE

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

C. BOPE

1. Install larger flow relief line from the BOPE stack (El. I. pg. 14)
2. Install muffler (El. I. pg. 14)
3. Install additional double gate preventer in the stack (El. I. pg. 14)
4. Modify drilling permits for KS-5, 6, 9, 10, 11, to include: larger flow relief line from BOPE stack; cyclonic muffler; and an additional double gate preventer in the stack. (DLNR)
5. All future geothermal drilling operations will be required to follow these procedures and must be addressed in all permit applications submitted to DLNR for approval. (DLNR)

10/1/91

"

"

"

"

DLNR
PGV

"

"

"

DLNR

PGV

PGV

PGV

N/A

N/A

D. Mud Pumps

1. Modify existing pumps (El. I. pg. 14)
2. Add a mud cooler or use a more efficient cooling system (El. I. pg. 14)

DLNR
PGV

"

PGV

PGV

GEOTHERMAL ACTION PLAN

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DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF WATER RESOURCE MANAGEMENT

I. PROGRAM

A. Item

1. Task

DUE DATE

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

3. Add a monitoring device for the driller.
(El. I. pg. 15)

DLNR
PGV

PGV

4. Amend plan of operations to include above
(DLNR)

"

N/A

E. Adequate Water Supply

1. Provide an adequate water supply
(El. I. pg. 14)

"

DLNR
PGV

PGV

F. Well Regulatory Oversight

1. Prepare MOU between DLNR and DOH assigning
oversight and control of production and
injection wells to one agency.
(El. I. pg. 15)

10/1/91

DLNR
DOH

N/A

A draft is being finalized.

2. Assign DLNR as lead agency for regulating
the KS-8 "kill" operations. (El. I. pg. 15)

"

DLNR
PGV

N/A

3. Require PGV well drilling permit resubmittal
if KS-8 is to be used as a production well.
(DLNR)

"

DLNR
PGV

N/A

Suggest 10/1/91 subject to successful
controlling of KS-8.

4. Require submittal of permit for
modification of KS-7. (DLNR)

"

DLNR
PGV

N/A

GEOTHERMAL ACTION PLAN

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DEPARTMENT OF LAND AND NATURAL RESOURCES DIVISION OF WATER RESOURCE MANAGEMENT

I. PROGRAM

A. Item

1. Task

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

DUE DATE

5. Retain technical drilling consultant (DLNR)

9/3/91

DLNR

N/A

Effective 8/28/91.

G. Casing Program

1. Require revised drilling and casing program from PGV for KS-4, 5, 6, 9, 10, 11 to include investigative report recommendations. (DLNR)

12/31/91

DLNR
PGV

N/A

2. All future geothermal drilling operations will be required to follow these procedures and must be addressed in all permit applications submitted to DLNR for approval. (DLNR)

DLNR

N/A

H. Amend Chapter 13-183 Administrative Rules

Delete specific BOPE requirements and procedures from rules. (El. I. pg. 16)

12/31/91

DLNR

N/A

I. Other

1. Prepare BOPE manual similar to California DOG (El. I. pg. 16)

12/31/91

DLNR

N/A

2. Insure flexibility in modifying on-site modifications to drilling plan. (El. I. pg. 15)

12/31/91

DLNR

N/A

GEOHERMAL ACTION PLAN

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DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER RESOURCE MANAGEMENT

I. PROGRAM		DUE DATE	AGENCIES:		COMMENTS / SCHEDULE
A. Item	1. Task		1. LEAD	1. COST	
			2. SUPPORT	2. SOURCE	
J.	Reassessment of Geothermal Resource Statewide				
1.	Evaluation of resource statewide by Technical Advisory Committee (DLNR)		DLNR TAC	DBED	
2.	Develop geothermal reservoir model - Kapoho (El. I. pg. 15)		DLNR DBED PGV	DBED	Use TAC
3.	Insure DLNR advised of any changes in PGV's reservoir model (El. I. pg. 15)		DLNR PGV	N/A	
4.	Review geothermal subzones (DLNR)		DLNR TAC	N/A	On-going project
5.	Develop a resource management plan (DLNR)		DLNR TAC	N/A	On-going project

GEOTHERMAL ACTION PLAN

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DEPARTMENT OF HEALTH/CLEAN AIR BRANCH

I. PROGRAM

A. Item

1. Task

AGENCIES

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

I. AIR MONITORING NETWORK

Tasks I.A.2., I.E.1., I.E.2., and I.E.3. accomplishes recommendation 2.1.1. - "The number of stations exceeds that necessary for compliance determination." (El. III, Pt. I, pg. 5)

A. Sampling Station Modifications

1. Modify intake lines at CAB stations and conduct regular cleaning. (El. III, Pt. I, pgs. 5 & 6)

11/1/91

CAB
need funding

\$6,000 ±

2. Convert ASAB Irvine station to multi-level meteorological station. (El. III, Pt. I, pg. 5)

3 mos. after
funding
received

ASAB

\$40,000 ±
need funding

3. Install meteorological equipment at ASAB Nanawale station. (El. III, Pt. I, pg. 5)

3 mos. after
funding

ASAB

\$20,000 ±
need funding
received

4. Install meteorological equipment at PGV SE and Woods stations. (El. III, Pt. I, pg. 5)

7/1/92

PGV
CAB

\$20,000 ±
each
PGV?

CAB to meet with PGV by 9/15/91.

B. Quality Assurance

1. Implement a quality assurance program. (El. III, Pt. I, pg. 5)

11/1/91

ASAB

No cost

GEOTHERMAL ACTION PLAN

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DEPARTMENT OF HEALTH/CLEAN AIR BRANCH

I. PROGRAM

A.	Item		1. LEAD	1. COST	
	1. Task	<u>DUE DATE</u>	<u>2. SUPPORT</u>	<u>2. SOURCE</u>	<u>COMMENTS / SCHEDULE</u>
	2. Establish tolerances in the QA program that reflect the desired low concentration accuracy. (El. III, Pt. I, pg. 6)	11/1/91	ASAB	No cost	
	3. Conduct gas line audits. (El. III, Pt. I, pg. 6)	11/1/91	ASAB	\$30,000/ yr. \pm need funding	
	4. Establish station logs and post at site. (El. III, Pt. I, pg. 6)	10/1/91	CAB	200 \pm CAB	
	5. Improve written procedures, data handling, and station equipment diagram. (El. III, Pt. I, pg. 6)	10/1/91	CAB	No cost CAB	
	6. Calibrate and audit stations at a lower range of H ₂ S than presently utilized. (El. III, Pt. I, pg. 6)	11/1/91	PGV ASAB	\$1,000/ station \pm need funding	About 2 months time period needed for preparation of calibration gas mixture.
C.	Portable Samplers				
	1. Developer to donate three Jerome equivalent portable H ₂ S samplers to the DOH. (El. III, Pt. I, pg. 6)	11/1/92 Could be sooner if funds and delivery available	PGV CAB	\$40,000 PGV	CAB to meet with PGV by 9/15/91.

GEOTHERMAL ACTION PLAN

Rev. 8/27/91

DEPARTMENT OF HEALTH/CLEAN AIR BRANCH

I. PROGRAM		AGENCIES			
A. Item		1. LEAD	1. COST	<u>COMMENTS / SCHEDULE</u>	
1. Task	<u>DUE DATE</u>	<u>2. SUPPORT</u>	<u>2. SOURCE</u>		
D. Data Handling					
1. Add functional data loggers at ASAB stations. (El. III, Pt. I, pg. 6)	Upon funding and delivery of equipment	ASAB	40,000 ±		
2. Add password level remote access into data. Provide access to agencies needing information. (El. III, Pt. I, pg. 6)	7/1/92	CAB ASAB PGV	Need funding	This task needs to be discussed in conjunction with unification program. Computer equipment and consultant to set-up system and programming.	
3. Integrate data from all stations and prepare monthly tables showing hourly averages and daily peaks of H ₂ S. (El. III, Pt. I, pg. 6)	7/1/92	CAB	Need funding	This task needs to be discussed in conjunction with unification program.	
E. Sampling Station Redistribution					
1. Relocate PGV Woods station to Leilani Estates. (El. III, Pt. I, pg. 7)	7/1/92	PGV CAB	\$10,000 ± PGV?	CAB to meet with PGV by 9/15/91 to develop plans.	
2. Relocate PGV Southeast station more to southeast. (El. III, Pt. I, pg. 7)	7/1/92	PGV CAB	\$10,000 ± PGV?	CAB to meet with PGV by 9/15/91 to develop plans.	
3. Drop CAB Alvarez station. (El. III, Pt. I, pg. 7)	7/1/92	CAB	NA	Upon relocation of PGV Woods station to Leilani Estates.	

GEOTHERMAL ACTION PLAN

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DEPARTMENT OF HEALTH/CLEAN AIR BRANCH
I. PROGRAM

AGENCIES

A. Item	1. Task	DUE DATE	AGENCIES		COMMENTS / SCHEDULE
			1. LEAD	1. COST	
			2. SUPPORT	2. SOURCE	
F.	Personnel				
	Two additional field personnel. (DOH)	11/1/92	DOH	\$120,000 (Legisla- tive)	On-site personnel to monitor well drilling operations and power plant operations including the coordinating of air monitoring activities.
II.	PERMITS AND COMPLIANCE REVIEW				
A.	Permits				
1.	Actively participate in source tests, and develop the ability to independently quantify H ₂ S emissions during drilling, stacking, and uncontrolled or controlled venting. (El. III, Pt. 1, pg. 8)	7/1/92	CAB	\$10,000 ± for source test equipment and training	
2.	Measurement characterization of drift and trace toxics contained in particulate and gas phase during emission release events. (El. III, Pt. I, pg. 8)	?	DOH	\$100,000 ± for contract services	Drift studies are very difficult to do and must be contracted out.
3.	Develop an accurate and compre- hensive emission inventory and geothermal resource chemical constituent database specific to the project and individual wells. (El. III, Pt. I, pg. 8)				

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DEPARTMENT OF HEALTH/CLEAN AIR BRANCH

I. PROGRAM

AGENCIES

A. Item		1. LEAD	1. COST	COMMENTS / SCHEDULE
1. Task	DUE DATE	2. SUPPORT	2. SOURCE	
4. Remove restriction of air drilling from the ATC permit. (El. III, Pt. I, pg. 9)	11/1/91	CAB	No cost	This recommendation will be thoroughly reviewed. If, found to be acceptable by the permit section, changes will be made to the permit.
5. Develop emission limits to all known emission points based upon BACT and tested for performance under good dispersion conditions.	on-going	CAB	No cost	BACT analysis is done for all emission points. Testing is done to determine compliance with ATC before PTO is issued. This recommendation is more applicable to the power plant.
B. Compliance				
1. Designate one government official to receive and investigate noise and air quality complaints. (El. III, Pt. I, pg. 8)	10/1/91	CAB/N&R		
2. Enforce emission limits. (El. III, Pt. II, pg. 2)	9/15/91	CAB		Initiated, forward draft to Deputy A.G.

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DEPARTMENT OF HEALTH/CLEAN AIR BRANCH

I. PROGRAM

AGENCIES

A. Item			1. LEAD	1. COST	
1. Task	<u>DUE DATE</u>		<u>2. SUPPORT</u>	<u>2. SOURCE</u>	<u>COMMENTS / SCHEDULE</u>

III. UNIFICATION OF AIR MONITORING NETWORK

A.	Reynolds' Recommendation	11/1/92	DOH	Need funding	The unification program should be accomplished; however, its scope needs to be defined. Both Reynolds and Goddard have good recommendations. We need to take their good points and establish a program that is manageable.
	Unify the air monitoring efforts into a single comprehensive program managed and audited by the state, but receives and follows input and policy from a committee consisting of environmentalists, industry, and agency people. (El. III, Pt. I, pg. 5)				
	Committee also to undertake the task of making recommendations for expansion of the monitoring network to include toxic pollutants. (El. III, Pt. I, pg. 5)				
B.	Goddard's Recommendation	7/1/92	DOH	Need funding	The unification program should be accomplished; however, its scope needs to be defined. Both Reynolds and Goddard have good recommendations. We need to take their good points and establish a program that is manageable.
	Establish a Puna Air Monitoring Program (PAMP) to be formed by DOH with participation by the developer, local agencies, state agencies, local concerned organizations, and local residents. (El. III, Pt. II, pg. 2)				
	PAMP would also do the following:				

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DEPARTMENT OF HEALTH/CLEAN AIR BRANCH

I. PROGRAM

AGENCIES

A. Item		1. LEAD	1. COST	<u>COMMENTS / SCHEDULE</u>
1. Task	<u>DUE DATE</u>	<u>2. SUPPORT</u>	<u>2. SOURCE</u>	
1. Establish an Operational Management of Air Resources (OMAR) type system to link all PAMP stations to a central computer to which an emergency response team is linked.	11/1/92			
2. Manage local and regional air transport studies.	11/1/92			
3. Quality assure monitoring data, document all quality assurance procedures and publish sufficient volumes of the monitoring documents and special studies for access by developers, engineers, and environmental scientists.	11/1/92			

GEOTHERMAL ACTION PLAN

Revised 08/27/91

DEPARTMENT / BRANCH

I. PROGRAM

A. Item

1. Task

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

DUE DATE

DEPT. OF HEALTH/NOISE AND RADIATION-Noise Section

I. Noise Monitoring Program

A. Noise Monitoring Stations

1. Review and inspect PGV permanent & mobile noise monitoring stations, and their capabilities. Assess sitings and recommend relocation, if appropriate. (El. III, Pt. I, pg. 7)

10/1/91

PGV
NR

N.A.

Noise and Radiation to meet with PGV; inspect, review and submit recommendations, if appropriate.

B. Noise Monitoring - Spot Checking

1. Develop and implement a comprehensive noise monitoring program; including inspection and noise sampling procedures, frequency, data collecting and reporting. (El. Pt. I, pg. 7)

10/1/91

PGV
NR

N.A.

Noise and Radiation to meet with PGV to establish noise monitoring program.

2. Aquisition of portable sound measuring equipment (sound level meters, analyzers graphic level recorders). (El. III, Pt. I, pg. 7)

N/A

NR

\$32,000

Upon availability of funds.

C. Noise Monitoring Station (Mobile/Unmanned)

1. Assess requirements for DOH monitor station. (El. III, Pt. I, pg. 7)

11/1/91

NR

\$150,000

Task requires communication with local acoustical consultants and sound measuring equipment manufacturers.

2. Operation of monitor station. (El. III, Pt. I, pg. 7)

11/1/91

NR

6 months after funding is received.

GEOHERMAL ACTION PLAN

Revised 08/27/91

DEPARTMENT / BRANCH

I. PROGRAM

A. Item

1. Task

DUE DATE

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

II. Noise Complaints

A. Complaint Response Program

- | | | | | |
|---|---------|-----------------|------|---|
| 1. Establish appropriate agency to intake and investigate noise complaint. (El. III, Pt. I, pg. 7) | 10/1/91 | NR
CP | | Noise and Radiation to meet with Hawaii County Planning and establish appropriate agency. |
| 2. Develop and implement a comprehensive complaint response program; including inspection and noise sampling procedures, data collecting and reporting. (El. III, Pt. I, pg. 7) | 10/1/91 | PGV
NR
CP | | Noise and Radiation to meet with Hawaii County Planning and establish appropriate agency. |
| 3. Documentation and review of all noise complaints received. (El. III, Pt. pg. 7) | 10/1/91 | PGV
NR
CP | N.A. | Meet with PGV and Hawaii County Planning for records of all complaints. |

III. Quality Assurance Program

A. Noise Source Identification

- | | | | | |
|---|---------|-----------|------|---|
| 1. Review and document all noise producing equipment. (El. III, Pt. I, pg. 8) | 10/1/91 | PGV
NR | N.A. | Meet with PGV for listing of all equipment utilized on site. |
| 2. Review of all BACT methods implemented to mitigate noise levels. (El. III, Pt. I, pg. 8) | 10/1/91 | PGV
NR | N.A. | Meet with PGV and inspect site for noise control measures utilized. |
| 3. Establish procedures for review of equipment to be utilized on site. (El. III, Pt. I, pg. 8) | 10/1/91 | PGV
NR | N.A. | Meet with PGV to establish procedures and implementation. |

GEOTHERMAL ACTION PLAN

Revised 08/27/91

DEPARTMENT / BRANCH
I. PROGRAM

AGENCIES:

A. Item 1. Task	DUE DATE	1. LEAD 2. SUPPORT	1. COST 2. SOURCE	COMMENTS / SCHEDULE

IV. Regulatory Program				
A. Geothermal Resource Permit (CHPD)				
1. Review of existing GRP noise level guidelines for appropriateness. (El. III, Pt. I, pg. 7)	10/1/91	NR CP	N.A.	Noise and Radiation to meet with Hawaii County Planning Dept. to review appropriateness of noise guidelines within GRP.
B. Noise Regulations and Permits				
1. Develop, establish and implement interim noise standards, guidelines and provisions for geothermal development operations under which drilling can resume. (El. III, Pt. I, pg. 7)	11/1/91	NR	N.A.	Noise and Radiation to meet with Hawaii County Planning Dept. and DLNR to establish noise regulations as part of geothermal permit.
2. Review of interim regulatory measures and establish permanent noise standards and provisions for geothermal development. (DOH)	12/31/91	NR		
3. Assess and review possible noise permit system for geothermal development. (El. III, Pt. I, pg. 7)	11/1/91	NR CP DLNR	N.A.	Same as above.
4. Develop and promulgate departmental noise rules statewide, including the island of Hawaii. (DOH)	12/31/92	NR	\$20,000	Adoption Dec. 31, 1992
V. Personnel Requirement				
A. Additional personnel (2) required to implement geothermal action plan, particularly for monitoring and complaint response programs. (DOH)	12/31/91	NR	\$120,000	

GEOHERMAL ACTION PLAN

Rev. 8/28/91

DEPARTMENT OF HEALTH/SAFE DRINKING WATER BRANCH

I. Program		AGENCIES			
A.	Item		1. Lead	1. Cost	
	1. Task	Due Date	2. Support	2. Source	Comments/Schedule
I.	Underground Injection Control Program	10/01/91	DOH		This action was recommended by the Independent Technical Investigation report by Thomas, Whiting, Moore and Milner. Implementation of the MOA will give assurance that all geothermal well designs will conform to acceptable standards and are properly constructed.
A.	Prepare Memorandum of Agreement (MOA) between DLNR and DOH assigning oversight and control of <u>drilling operations</u> for production and injection wells to one agency (El. I, pg. 15)				
B.	PGV to acquire DLNR's geothermal well drilling permit for KS-7 and KS-8. PGV to revise the design of the geothermal wells as directed by DLNR's permit. (DOH)	10/01/91	DLNR DOH		DLNR's permit for KS-7 and KS-8 will implement the MOA between DLNR and DOH. Any revisions PGV makes to the well design shall be approved by DLNR, as lead agency, in concert with DOH.
C.	DOH to conduct and update vulnerability assessments of groundwater supplies in geothermal resource zones.	11/01/92	DOH DLNR	60,000	This activity should be conducted in the future in concert with other vulnerability assessments for other watershed areas. Requires additional environmental engineers. This issue is not reflected in any of the consultant's reports.

GEOHERMAL ACTION PLAN

Revised 8/27/91

DEPARTMENT OF HEALTH/HAZARDOUS EVALUATION & EMERGENCY RESPONSE OFFICE

AGENCIES:

I. PROGRAM

A. Item	1. LEAD	1. COST	COMMENTS / SCHEDULE
1. Task	2. SUPPORT	2. SOURCE	
DUE DATE			
1. Review H ₂ S monitoring capability and procedures for upset conditions. (El. II, pg. 11)	1. DOH 2. HCD, HPD, HFD		Conducted primarily by DOH, DOH-Heer will review procedures. This will require 1 month to complete.
2. Complete a health review of the warning alert, and emergency action levels for H ₂ S. Hire Toxicologist. (El. II, pg. 11)	1. DOH 2. HCD	1. 60,000 2. State	Baseline research by and a Hazard Evaluation to review the risk of complex chemical mixture. Require toxicologist support.
3. Complete a revised analysis of the hazard of an uncontrolled venting of the PGV Well. (El. II, pg. 11)	1. DOH 2. HCD, DLNR, DBED	1. 5,000 2. DBED, PGV	Revised analysis based upon work developed in Phase III of investigation/assistance from Wilson Goodard consultant. PGV to provide additional information.
4. Upon completion of items 1 through 3 above, review, revise and exercise the PGV Emergency Response Plan. Expedite establishment and hiring of Planner IV and V positions. (El. II, p. 11)	1. DOH-HEER, HCD		PGV must amend emergency response plan based on 1, 2, & 3 and submit to DOH HCD review. Requires expedited processing and approval by DPS.
5. Resolution of confusion over housing reimbursement and the function of the PGV employee alarm system. (El. II, pg. 11)	To be determined by HCPD	Hawaii County Planning Department	Hawaii County Planning Department to complete.
6. Review notification procedures and provide appropriate verbal and written notification to ensure compliance with the Emergency Planning and Community Right-To-Know Action of 1986. (El. II, pg. 12)	1. DOH 2. HCD		

GLOSSARY

ASAB - Air Surveillance and Analysis Branch (Air Lab)

BACT - Best Available Control Technology

BOPE - Blowout Prevention Equipment

CAB - Clean Air Branch

CHPD - County of Hawaii Planning Dept.

HCD - Hawaii County Civil Defense

HFD - Hawaii County Fire Dept.

HPD - Hawaii County Police Dept.

PGV - Puna Geothermal Venture (OESI)

N & R - Noise and Radiation Branch

QA - Quality Assurance

(todolist.91)

8/15/91

Manabu/Gordon:

Update of 8/14/91 meeting with DBED (M. Towill, M. Wong-Wilson, D. Anderson, J. Lesperance), DOH (B. Anderson, T. Arizumi, M. Ingoglia, J. Haruno, W. Nagamine, W. Sano), AG (C. Watanabe), DLNR (W. Paty, D. Nakano) regarding of implementation of the State Action Plan.

- ✓o Tues. (8/20/91) at 8:30 am at DWRM, Room 227. State Task Force (DOH, DBED, DLNR) meeting (staff level) to finalize Action Plan for each agency. The State's Integrated Action Plan combining all agencies must be completed no later than Thurs. (8/22/91). Per Paty, Manabu to attend for DLNR. Need to confirm availability of conference room.
- ✓o Tues. (8/20/91) at 1:30 pm at DBED, 11th Floor, Central Pacific Bank Bldg. State Task Force (Director/Division level) to meet with Hawaii County officials (B. Mizuno, H. Kim, R. Nakano) regarding joint State and County Action Plan. Per Paty, Manabu to attend for DLNR.
- o DLNR needs to look at hiring a "drilling" consultant to oversee geothermal operations and instruct staff. This should be done before Harry Kim/County decides to hire a consultant and chastise the State for not moving quickly enough or in a responsible manner. Need to determine scope of work and length of contractual period.
- o DLNR must prepare as soon as possible (before 8/22/91) a DLNR Action Plan which addresses the implementation of the Investigation Report's recommendations, the Asset Fund, Relocation, PGV's royalty waiver request and selection of a royalty calculation method, and Future legislation such as the need for statutory authority to direct HGP-A revenues to the Asset Fund. (See Aagsalud memo, Anderson to Towill memo, and Tagomori to Paty memo for direction.)

The DLNR Action Plan memo shall be prepared in the format provided by DBED (see DOH memo for example). The format will probably be as follows:

Part A: Those actions which must be undertaken by both the regulatory agency and the developer before resumption of drilling activity. The description of these action must include the following:

<u>Task/Action</u>	<u>Date</u>	<u>Cost/Source of Funds</u>	<u>Lead Agency</u>
(example)			
Revise Drilling/Casing program	ASAP	\$0/ N/A	PGV
Revise permits	ASAP	\$0/ N/A	DLNR

Part B: Those actions that can take place after drilling starts again.

<u>Task/Action</u> (example)	<u>Date</u>	<u>Cost/Source of Funds</u>	<u>Lead/Support Agency</u>
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Hire staff	ASAP	\$100,000/Unknown	DLNR
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(Suggestion, for purposes of preparing the DLNR Action Plan, I would rewrite the memo from Tagomori to Paty and revise by adding completion dates for each task, estimated costs, etc. in the format instructed by DBED. Note: DBED has offered to assist DLNR in preparing the Action Plan.)

Update of recent (8/13/91) meeting with Hawaii County Civil Defense (Harry Kim), Mayor's Office (Barry Mizuno), DOH (Jerry Haruno and staff), County Planning Dept. (Rodney Nakano), DBED (Dean Anderson), and DLNR (Tanaka and Nakano) regarding water well MW-3 and control of well KS-8:

- o Daily reports concering MW-3 and KS-8 activities prepared by PGV will be sent to all agencies thru Civil Defense Agency (CDA).
- o Requirement for DLNR representation at weekly meetings in Hilo at the CDA office. All meetings scheduled for Tuesday at 10 am. Other agencies have been required to participate also.
- o No decision has been made concering when the emergency proclamation status will be terminated. (i.e. When the bottom cement plug is set in KS-8, or after 9 5/8" casing is set, or after KS-7 is plugged, or even beyond ?)
- o Harry Kim continues to question whether DLNR is capable and knowledgable enough to oversee the well control operations for KS-8. Kim and Mizuno repeatedly bring up the issue of hiring a consultant(s) to check on PGV operations who shall be paid by the State (i.e. DLNR) and not the County. County has indicated that if deemed necessary they will hire a consultant and try to tap the Governor's \$1 million dollar emergency fund to pay for this expense.
- o Harry Kim "requires" 24-hour monitoring by DOH for noise/air for the duration of the emergency which includes the water well drilling and well control of KS-8.
- o A meeting with the County and DBED regarding the start-up of the SOH project did not go well. Although DLNR has no objections to DBED's plan to remove the plug in HGP-A and clean out the SOH holes, Harry Kim and the County had some concerns.

Presented below is a summary of things that are currently pending and which must be finalized as soon as possible:

GEOTHERMAL THINGS TO DO
(As of 8/15/91)

Note: Items are not listed by priority or in chronological order.

- 1) Finalize and process extension of primary 10-year term for geothermal resource mining leases R-1 and R-2.
- 2) Finalize and process extension of primary 10-year term for geothermal resource mining lease R-3. (Note: Land Mgt. will probably require AG review and approval of extension similar to that required for leases R-1 and R-2.)
- 3) Arrange for DLNR representative to attend regular State/County meetings scheduled every Tuesday at 10 am at the Hawaii County Civil Defense Headquarters in Hilo. These meetings concern the drilling of water well MW-3 and the well control operations for well KS-8, and will continue to be held until further notice. (Note: The next meeting has been rescheduled for Wednesday 8/21/91 at 10 am at Civil Defense in Hilo.)
- 4) Finalize Memorandum of Understanding (MOU) between DOH and DLNR authorizing DLNR to permit all geothermal wells (injection and production).
- 5) Decide on the hiring of consultants. Should discuss the consultant proposal submitted by Ralph Patterson and Associates. (Note: also received a call from Dick Whiting offering to assist DLNR in teaching staff and overseeing geothermal operations. The verbal offer included the following: A (2) man team comprised of Dick Whiting and Duey Milner who would alternate assignments on a 1-month on/1-month off basis whereby one member would be available at all times. Consultant rates are negotiable starting a \$375/day plus expenses and airfare.) The other option to consider is the hiring of a consultant on a on-call basis, selection of that consultant to be determined.
- 6) Need to finalize DLNR "approval" of KS-8 well control program (reference 8/5/91 letter from PGV to Paty). Draft has been prepared stating that DLNR has no objections to the proposed plan, however, we should be aware of the concern of the County as it relates to DLNR's ability to properly regulate and monitor the operations. (Note: there is the strong possibility that the County will hire its own consultant who may potentially contradict DLNR's "approval" of the PGV plan.)
- 7) Need to follow-up on Agsalud's Memo to DLNR (8/12/91) regarding on-going and planned activities and pay special attention to the timetables imposed by the memo. (See memo for specific details.)

Parallel Columns

When typing in parallel columns, press Hard Page to end each item. For example, to enter information about a product in an inventory list, type the product name, press Hard Page, type the amount on hand, press Hard Page, type the inventory date, press Hard Page, etc.

If you do not know the information for a particular item, press Hard Page to leave an open column in which to type the text later on. When you return to enter missing information, make sure the cursor is in the correct column.

When you press Hard Page at the end of the last column for parallel columns, the cursor wraps to the beginning of the first column and inserts the following codes in the Reveal Codes screen:

Parallel

[Col Off]

[HRt]

[Col On]

Parallel with Block Protect

[BlockPro:Off][Col Off]

[HRt]

[BlockPro:On][Col On]

If you are typing an inventory list with Block Protect, each product in the list begins with [BlockPro:On] [Col On] and ends with [BlockPro:Off][Col Off]. All the material between the codes forms a block and is kept together.

When deleting or moving a column, [BlockPro:On] at the beginning and [BlockPro:Off] at the end of the information should be included in the block.

GEOHERMAL ACTION PLAN

SECTION A: ACTIONS TO BE COMPLETED BEFORE DRILLING SUSPENSION IS LIFTED

DEPARTMENT / BRANCH

I. PROGRAM

A. Item

1. Task

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

GEOHERMAL ACTION PLAN

SECTION B: ACTIONS TO BE COMPLETED AFTER DRILLING SUSPENSION IS LIFTED

DEPARTMENT / BRANCH

I. PROGRAM

A. Item

1. Task

DUE DATE

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

GEOTHERMAL ACTION PLAN

SECTION A: ACTIONS TO BE COMPLETED BEFORE DRILLING SUSPENSION IS LIFTED

DEPARTMENT / BRANCH

I. PROGRAM

A. Item

1. Task

DUE DATE

AGENCIES:

1. LEAD

2. SUPPORT

1. COST

2. SOURCE

COMMENTS / SCHEDULE

I. AIR MONITORING NETWORK

A. Sampling Station Redistribution

1. Relocate PGV Woods station to Leilani Estates

PGV
CAB

CAB to meet with PGV by 9/15/91 to develop plans

2. Relocate PGV Southeast station more to southeast

PGV
CAB

Same as above

3. Drop CAB Alvarez station

CAB

Upon relocation of PGV Woods station to Leilani Estates

B. Sampling Station Modifications

1. Convert ASAB Irvine station to multi-level meteorological station

ASAB

Three months after funding is received

2. Install meteorological equipment at ASAB Nanawale station

ASAB

Three months after funding is received

3. Modify intake lines at CAB stations and conduct regular cleaning

11/1/91

CAB

4. Install meteorological equipment at PGV SE and Woods stations

PGV
CAB

CAB to meet with PGV by 9/15/91

C. Quality Assurance

1. Implement a quality assurance program

11/1/91

ASAB

2. Establish tolerances in the QA program that reflect the desired low concentration accuracy

11/1/91

ASAB

GEOHERMAL ACTION PLAN

SECTION A: ACTIONS TO BE COMPLETED BEFORE DRILLING SUSPENSION IS LIFTED

- | | | |
|---|---------|-------------|
| 3. Conduct gas line audits | 11/1/91 | ASAB |
| 4. Establish station logs and post at site | 10/1/91 | CAB |
| 5. Improve written procedures, data handling and station equipment diagram | 10/1/91 | CAB |
| 6. Calibrate and audit stations at a lower range of H2S then presently utilized | 11/1/91 | PGV
ASAB |

D. Data Handling

- | | | |
|---|------|----------------------------|
| 1. Add functional data loggers at ASAB stations | ASAB | Upon purchase of equipment |
|---|------|----------------------------|

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